WHAT IS CLAIMED IS:

1. An apparatus for chemical mechanical polishing, comprising:

a platen to support a polishing surface; and

an eddy current monitoring system to generate an eddy current signal, the eddy current monitoring system comprising:

an elongated core positioned at least partially in the platen, the elongated core having a length and a width, the length longer than the width.

2. The apparatus of claim 1, wherein the elongated core comprises a back portion and one or more protrusions extending perpendicularly from the back portion towards the polishing surface.

3. The apparatus of claim 2, further including a coil coupled with at least one of the one or more protrusions.

4. The apparatus of claim 3, wherein the coil comprises woven wire.

5. The apparatus of claim 3, wherein the one or more protrusions include a first protrusion and a second protrusion, and wherein the coil is coupled with the first protrusion and the second protrusion in a figure eight configuration.

6. The apparatus of claim 3, further including another coil coupled with the back portion.

7. The apparatus of claim 1, wherein the length is at least twice the width.

8. The apparatus of claim 1, wherein the length is between about five millimeters and about ten centimeters.

9. The apparatus of claim 1, wherein the width is less then about a centimeter.

10. The apparatus of claim 1, wherein the eddy current monitoring system further includes a shield positioned proximate an outer surface of the elongated core.

11. The apparatus of claim 10, wherein the shield includes a gap.

12. An eddy current sensing system, comprising:

an elongated core having a length and a width, the length longer than the width;

a housing having mounting features shaped and configured to position the elongated core in a recess of a platen;

a coil wound around a portion of the elongated core;

a drive system to generate a current in the coil; and

a sense system to derive a characteristic of a conductive region based on eddy currents generated in the conductive region.

13. The system of claim 12, wherein the elongated core comprises a back portion and one or more protrusions extending perpendicularly from the back portion towards the polishing surface

14. The system of claim 13, further comprising a coil coupled with at least one of the one or more protrusions.

15. The system of claim 12, wherein the elongated core comprises a ferrite material.

16. The system of claim 15, wherein the ferrite material is chosen from the group consisting of a MnZn ferrite material and a NiZn ferrite material.

17. The system of claim 12, wherein the elongated core is coated with a material.

18. The system of claim 17, wherein the material comprises parylene.

19. The system of claim 17, further comprising:

the platen, including complementary mounting features to receive the housing;

a polishing pad having a polishing surface mounted to the platen, such that when the mounting features of the housing engage with complementary features of the patent a top surface of one of the one or more protrusions of the elongated core is positioned about two millimeters or less from the polishing surface of the pad.

20. The system of claim 19, wherein the top surface is positioned between about one millimeter and about two millimeters from the polishing surface.

21. The system of claim 19, wherein the elongated core has a generally U-shaped cross section.

22. The system of claim 19, wherein the elongated core has a generally E-shaped cross section.

23. A method of in-situ profile control comprising:

processing a conductive layer on a wafer using a plurality of processing parameters;

inducing eddy currents in a first region of a conductive layer on a wafer, the first region having a length greater than a width; and

acquiring measured thickness data for the conductive layer in the first region, the thickness data based on the eddy currents induced in the first region.

24. The method of claim 23, further including:

inducing eddy currents in a second region of the conductive layer, the second region having the length and the width; and

acquiring measured thickness data for the conductive layer in the second region, the thickness data based on the eddy currents induced in the second region.

25. The method of claim 24, further comprising comparing the measured thickness data for the conductive layer in the first region and the second region to a desired thickness profile to determine a profile error.

26. The method of claim 25, further comprising changing at least one of the processing parameters based on the profile error.

27. The method of claim 23, wherein the length is at least twice the width.

28. The method of claim 23, wherein the width is about a millimeter or less.

29. The method of claim 23, wherein the width is between about one millimeter about three millimeters.

30. The method of claim 23, wherein the eddy currents are generated in response to a time-dependent magnetic field generated with a coil coupled with an elongated core.

31. The method of claim 23, wherein acquiring measured thickness data for the conductive layer in the first region comprises acquiring amplitude data based on an amplitude of a sense signal in a sense coil.

32. The method of claim 23, wherein acquiring measured thickness data for the conductive layer in the first region comprises acquiring phase data based on a phase of a sense signal in a sense coil.

33. The method of claim 23, wherein acquiring measured thickness data for the conductive layer in the first region comprises acquiring drive current data based on a drive current to maintain a constant voltage across a coil and a capacitor, the coil and the capacitor included in a circuit to generate a time-dependent magnetic field to induce the eddy currents in the first region.

34. A semiconductor processing apparatus, comprising:

a direct current (DC) coupled marginal oscillator to generate a time-dependent drive current;

a coil to generate a time-dependent magnetic field to couple with a portion of a conductive region on a wafer, the marginal oscillator comprising:

a first transistor and a second transistor comprising a long-tailed pair;

a third transistor, the third transistor coupled with the first transistor to provide DC feedback through a base of the first transistor.

35. The apparatus of claim 34, wherein the marginal oscillator is to generate the time-dependent drive current at a resonant frequency of a circuit, the circuit comprising the coil coupled with a core and a capacitor.

36. The apparatus of claim 35, wherein the core is an elongated core.

37. The apparatus of claim 35, wherein the core is generally cylindrically symmetric.

38. The apparatus of claim 34, wherein the third transistor provides direct current feedback to the base of the first transistor to cause the marginal oscillator to generate the time-dependent drive current such that a potential difference across the coil and the capacitor is maintained at a generally constant amplitude.

39. The apparatus of claim 38, further including a feedback circuit to sense the amplitude of the potential difference across the coil and the capacitor.

40. A method comprising:

generating a time-dependent current at a resonant frequency of a circuit comprising a coil coupled with a core and a capacitor, the time-dependent current generated by a marginal oscillator having a first transistor and a second transistor comprising a long-tailed pair;

inducing eddy currents in a first region of a conductive layer on a wafer, wherein the eddy currents are induced by a time-dependent magnetic field produced by the coil;

determining an amplitude of a potential difference across the coil and the capacitor;

adjusting the time dependent drive current based on direct current feedback from a third transistor coupled to the base of the first transistor to maintain a desired amplitude of the potential difference; and

determining one or more parameters of the first region based on the drive current.

41. The method of claim 40, wherein the one or more parameters of the conductive region include a thickness of the conductive region.

42. The method of claim 40, wherein the one or more parameters of the conductive region include an endpoint of a process for polishing the conductive region.

43. The method of claim 40, further comprising translating the core with respect to the wafer so that the time-dependent magnetic field induces eddy currents in a second region of the conductive layer.

44. The method of claim 43, further comprising:

determining a subsequent amplitude of the potential difference across the coil and the capacitor;

adjusting the time dependent current of the first transistor and the second transistor based on direct current feedback from a third transistor coupled to the base of the first transistor to maintain the desired amplitude of the potential difference; and

determining one or more parameters of the second region based on the drive current.

45. The method of claim 44, wherein the one or more parameters of the first region include a thickness of the first region, and wherein the one or more parameters of the second region include a thickness of the second region, and further comprising comparing the thickness of the first region and the thickness of the second region to a desired thickness profile to determine a profile error.

46. The method of claim 45, further comprising adjusting one or more processing parameters based on the profile error.

47. An apparatus for semiconductor processing, comprising:

a wafer carrier;

an elongated core positioned proximate to the wafer carrier, the elongated core having a length and a width, the length longer than the width;

a coil wound around a portion of the elongated core;

a drive system to generate a current in the coil, the current to produce a time-varying magnetic field; and

a sensing system to derive a characteristic of a wafer positioned in the wafer carrier based on eddy currents generated in a conductive portion of the wafer, the eddy currents generated in response to the time-varying magnetic field.

48. The apparatus of claim 47, wherein the elongated core comprises a back portion and one or more protrusions extending perpendicularly from the back portion towards the wafer carrier.

49. The apparatus of claim 48, wherein the one or more protrusions include a first protrusion and a second protrusion, and wherein the coil is coupled with the first protrusion and the second protrusion in a figure eight configuration.

50. The apparatus of claim 47, further including a translation mechanism to translate the elongated core with respect to the wafer carrier.

51. The apparatus of claim 47, wherein the wafer carrier comprises a polishing pad mounted to a platen.

52. The apparatus of claim 47, wherein the drive system comprises a marginal oscillator.

53. The apparatus of claim 52, wherein the sensing system comprises a feedback circuit to determine a drive current of the marginal oscillator.